## THE BASICS OF THE SET

The Advent VideoBeam Set consists of two pieces: a receiver-projector unit and a separate free-standing screen.

The receiver-projector, which we will call simply the projector from here on, receives television broadcasts in the normal way. But as the signal is received, the projector beams the resulting picture across the room to the separate screen. All of the electronic steps needed to produce a television picture are taken inside the projector unit, and what travels from the projector to the screen is a simple beam of reflected light like that produced by a moving-picture projector. The "electron beam" that produces a television picture is *not* projected, and there consequently is no radiation hazard in transmitting the picture across a room.

The screen has no resemblance to a conventional television screen. It has no coating of phosphors, and no electronic circuitry of any kind. It is essentially an advanced kind of movie screen. Its surface is curved, and it employs a new, highly reflective aluminum screen material. It stands on legs, with its lower edge thirty-two inches off the floor, and its total height is roughly seven feet. Wall-mounting of the screen is possible (brackets for the purpose are available), but requires effort and care.

There is no wiring connection between projector and screen. Sound as well as the picture is beamed at the screen from the projector, and is effectively directed back at the audience by the screen's curved surface – so that it appears to originate from the screen itself.

The projector unit is housed in a chairside cabinet of molded plastic, thirty-three inches high, with picture controls on the top surface near the rear. Each of the three LightGuide™ projection tubes at the front of the cabinet transmits one of the three primary colors – red, blue, and green – used in color television broadcasting, and the three separate color beams converge at the screen for a full-color picture.

The screen to which they beam the picture is intended to be placed at a fixed distance of approximately eight feet from the front surface of the projection tubes. This fixed projection distance (plus or minus an inch and a half for optimum focus) is a crucial factor in the optical design that makes it possible to achieve a projection system of very high quality for a fraction of the previous cost. Picture size is also fixed as part of this design, as is the angle of projection and the height of projector and screen.

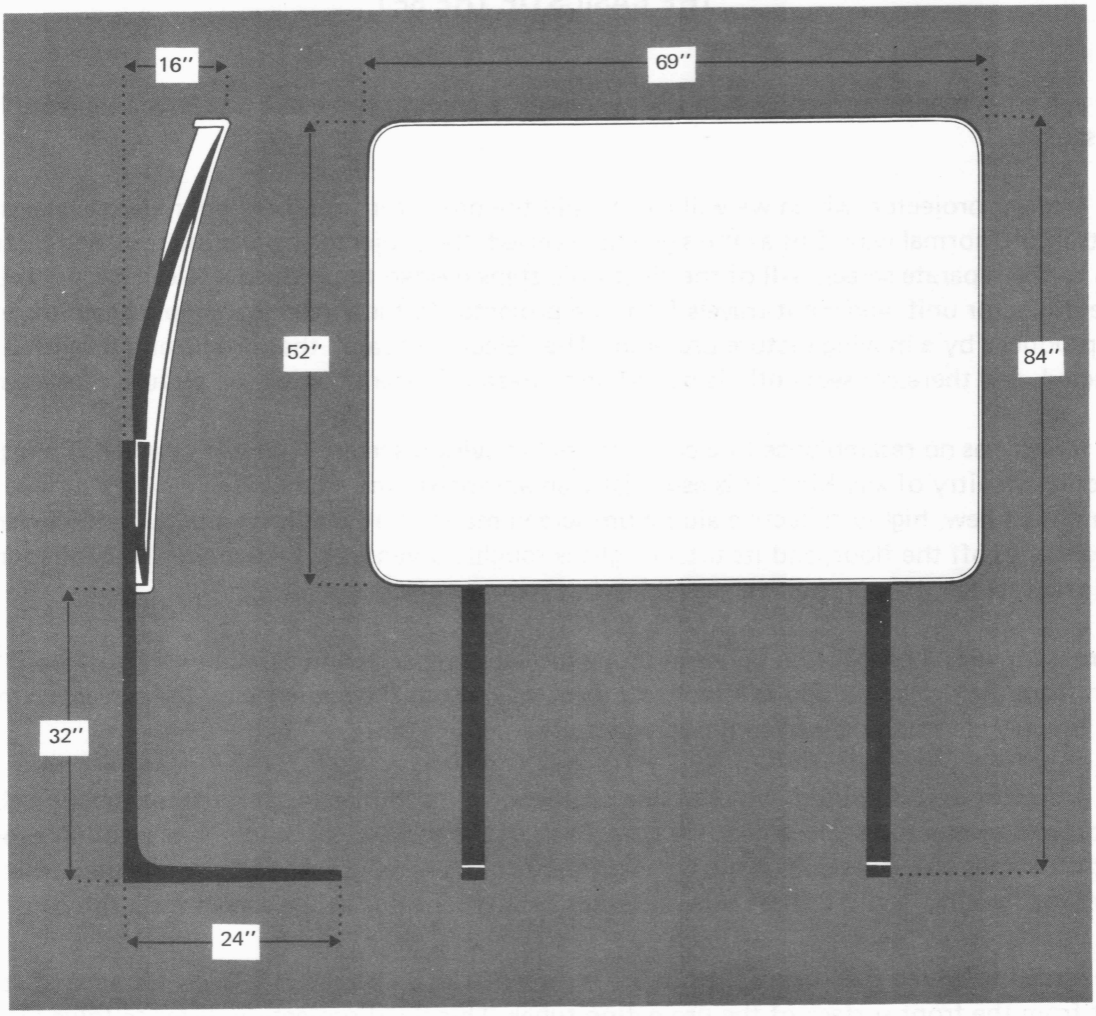


Figure 1-1. THE VIDEOBEAM SCREEN

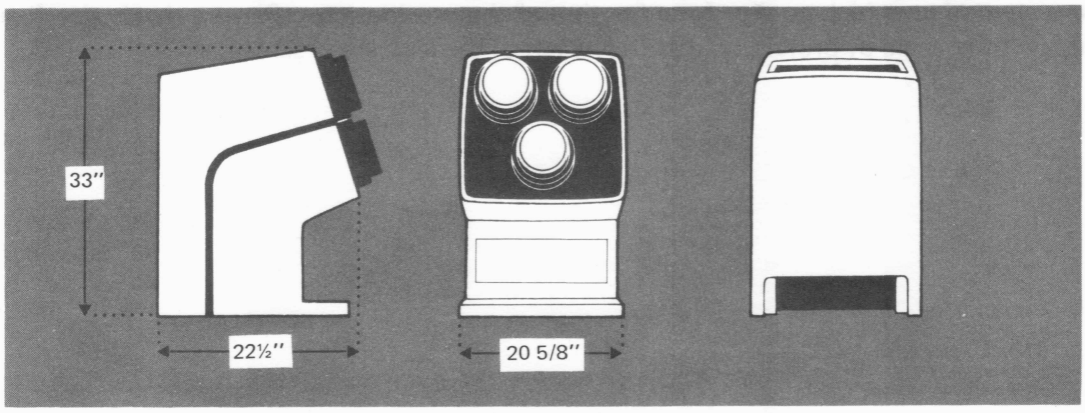


Figure 1-2. THE VIDEOBEAM RECEIVER-PROJECTOR

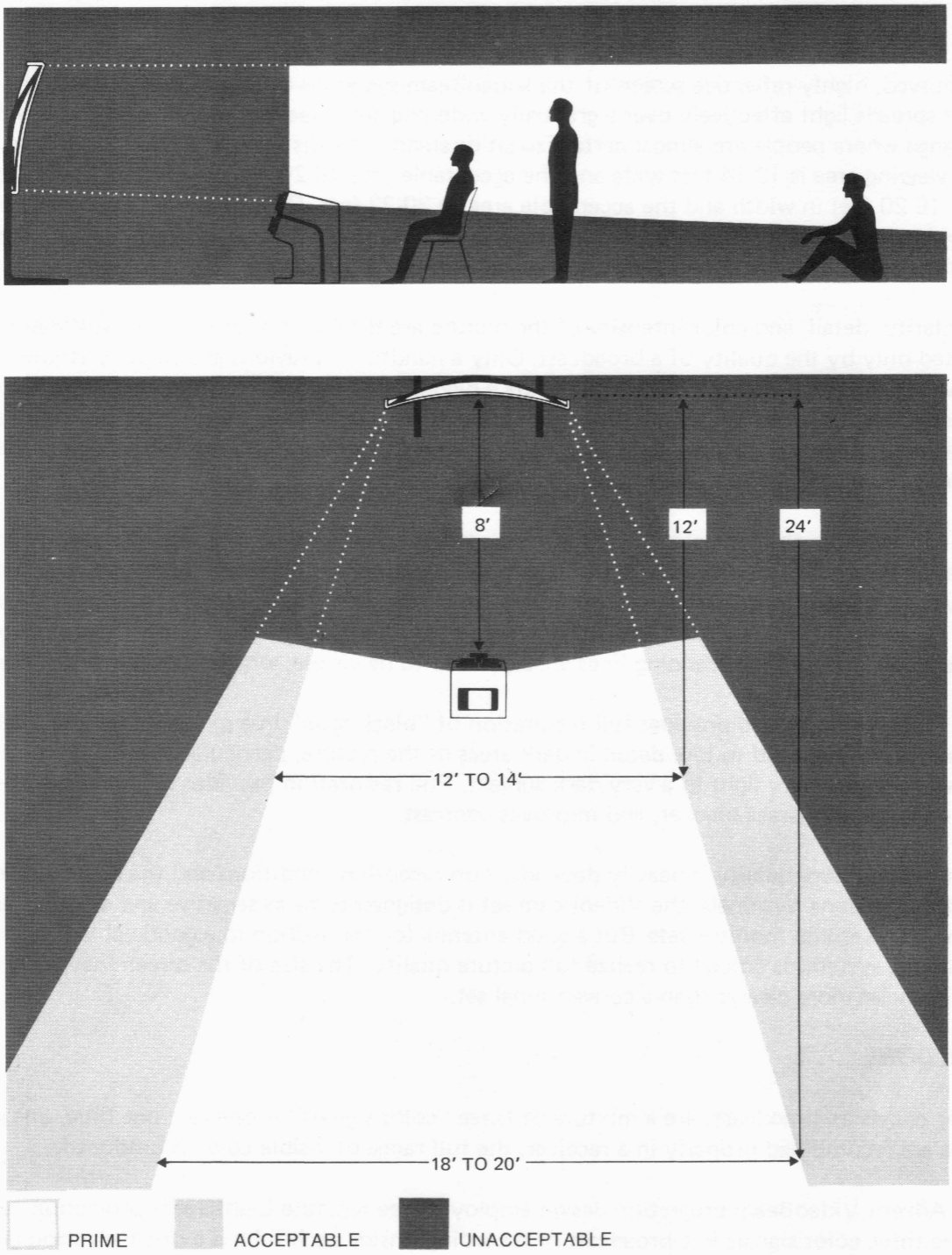


Figure 1-3. VERTICAL AND HORIZONTAL VIEWING AREA

NOTE: The horizontal spread angle of the VideoBeam screen material is defined by Kodak as $60^{o}$; others using this material for projection TV system define the angle as up to $80^{o}$.

## THE PICTURE

The curved, highly reflective screen of the VideoBeam system is a crucial contributor to its brightness. The screen spreads light effectively over a gradually widening area (See Figure 1-4), and focuses it vertically over the range where people are almost certain to sit or stand. At a distance of 12 feet back from the screen, the prime viewing area is 12-14 feet wide and the acceptable area 18-20 feet. At 24 feet back, the prime area spreads to 18-20 feet in width and the acceptable area to 30-32 feet. Outside these boundaries, which continue to widen at the same rate as you move further back from the screen, brightness and apparent color intensity diminish, but there are no distorted optical effects.

The clarity, detail, and color intensity of the picture are the result of circuitry of sufficient bandwidth to be limited only by the quality of a broadcast. Only a handful of previous sets, mainly studio monitors, have equivalent circuitry. When a station transmits a high-quality color signal, the resulting picture is likely to amaze anyone who has never seen a set designed for fullest picture resolution. But the high-resolution optics and large screen size, it's worth noting, *will also reveal blurring and other imperfections that may not be noticeable on smaller, lower-quality sets.*

One key factor in the set's clarity is that it maintains proper vertical interlace of the scanning lines that make up a television picture. Interlace is often so poorly maintained in conventional sets that the lines essentially drift together, cutting picture resolution by almost half and causing the scanning lines to be visible on the screen. (This situation has been so bad for so long in conventional sets that many people have come to believe that the scanning lines are *supposed* to be visible, which is anything but the case.)

The VideoBeam set also provides full restoration of "black level" in a picture. Conventional sets lacking full restoration tend to lose detail in dark areas of the picture, particularly when there is a sudden camera switch from a very light to a very dark subject. Full restoration provides this detail, keeps large black (or dark) picture areas blacker, and improves contrast.

Since final picture quality is heavily dependent on reception conditions and the quality of the signal arriving at the antenna terminals, the VideoBeam set is designed to be as sensitive and selective as the best conventional and studio monitor sets. But a good antenna (or connection to a good cable-TV or other master-antenna system) is crucial to realize full picture quality. The size of the screen inevitably shows signal deficiencies more clearly than a conventional set.

### HOW IT'S DONE

Color television braodcasts are a mixture of three "color signals" — one red, one blue, one green. When the signals are recombined properly in a receiver, the full range of visible color is produced.

The Advent VideoBeam projection design employs three separate LightGuide projection tubes, one for each of the three color signals in a broadcast or recording. Inside each tube is a single electron gun for the color the tube will transmit to the screen across the room. The gun is aimed to scan a three-inch, phosphor-coated target screen inside the tube, which lights up in the color of the phosphor coating. Since this light-emitting target need produce only one color, it can be uniformly coated with a single phosphor for the desired color. The color dots or lattices of conventional sets are not needed, nor is a shadow mask — making for far higher efficiency than is possible in a direct-view picture tube. (This efficiency is the key to satisfyingly bright projection.) The light given off is reflected by a spherical mirror, which directs the light out of the tube via a corrector lens. The mirror focuses the light from each point on the internal target to the corresponding area of the big screen across the room. And when the separate red, blue, and green images from the three LightGuide tubes converge on the big screen, the full-color picture is produced.

As roundabout as this may seem in the description, it is a good deal simpler to execute precisely than the usual direct-view CRT configuration. The beam from the single electron gun inside each tube sweeps back and forth over a span of only fifteen degrees instead of the ninety degrees required by the design of most picture tubes, making it far easier to maintain excellent picture linearity across the screen. With no need for clusters of color dots or for the color lattices employed in more recent picture tubes, and no concern that an electron beam may strike the wrong color phosphor, the usual fussy convergence of electron beams on the face of a picture tube becomes a simpler matter of overlapping the beams from the three LightGuide tubes on the big external screen.

The design of the LightGuide tube is a critical factor in the performance of the system. The Schmidt optical system it employs was first used for wide-angle telescopes for observatories.

In previous projection television systems for theaters and industrial use, the Schmidt or other optics were located outside the projection tube itself. We felt this was unacceptable for a system to be used in homes and elsewhere by non-technical people, since the external optics required careful operation and maintenance by a knowledgeable technician.

So we designed (and manufacture) the LightGuide tube with all critical optical parts sealed in a fixed relationship inside the tube. This allows all critical optical adjustments to be made once and for all in the manufacturing process rather than by the operator of the set, and it keeps the highly vulnerable optics out of the way of dust and damage. Only the front of the corrector lens is exposed, requiring occasional dusting.

Also critical in the set's performance, and also designed and manufactured by Advent, is the large screen. It employs a new, highly reflective aluminum surface material (manufactured under license from Kodak) that is five times more reflective than a conventional lenticular or beaded screen. It is the combined efficiency of the new screen and the LightGuide projection tubes (which have no shadow mask to absorb and waste potential picture brightness) that achieves the brightness necessary to make for a satisfying picture in a room with background lighting.

The efficiency of the VideoBeam projection system is so high that, despite the tremendous brightness requirements of a projection system, the set consumes less power than conventional vacuum-tube color TV sets and no more power than the newest solid-state color sets.

## SPECIFICATIONS

### PICTURE SIZE

4¼ ft. high by 5-2/3 ft. wide (51.5" by 68.5"); 24.5 sq. ft. (3,528 sq. in.) (not variable).

### BRIGHTNESS

More than 20 foot-lamberts on axis (well within the brightness range for motion picture theaters recommended by the Society of Motion Picture and Television Engineers).

### VIEWING ANGLES

See Figure 1-3.

### SCREEN TO PROJECTOR LENS DISTANCE

100"±1" (not variable)

### RESOLUTION

Determined by NTSC video bandwidth; not limited by electron optics, projection lens system, or by segmentation of raster into color dots or stripes.

### SIGNAL STANDARD

VideoBeam television operates from regular American broadcasts and external sources; 525 scanning lines interlaced 2-1 with 60 Hz field rate and 30 Hz frame rate; picture aspect ratio 4:3; NTSC color standard.

### TUNER

All VHF and UHF channels (2-83), with switchable Automatic Fine Tuning.

### SPECIAL CIRCUIT FEATURES

Highly selective nine stage IF filter followed by complete amplitude and phase linearization.
Comb filter providing full luminance and chrominance bandwidths.
Chroma demodulation along I and Q axes.
No interaction between Horizontal Hold and color tint, or between Contrast and Brightness controls.
Variable aperture correction ("Detail") control.
100% DC restoration with back porch clamping.
Proper interlace of scanning lines maintained over wide range of operating conditions.
Built-in crosshatch test pattern generator and user operable controls permit simple adjustment of focus and static convergence.
Keystone correction circuitry to accommodate the off-axis projection design.
Video and audio inputs and outputs.

### SOUND SYSTEM

A full range acoustic suspension loudspeaker in a sealed enclosure and an audio amplifier with response tailored to the speaker provide ample volume for most installations over a useful bandwidth of 80-12,000 Hz. The loudspeaker is located at the lower front of the projector so that sound is reflected from the screen.

A jack is provided for external amplification when desired.

### INPUTS AND OUTPUTS

**Antenna Input**

75 ohms unbalanced for VHF and UHF (Type "F" connector)

Antenna is not supplied.

**Video Input**

1 volt peak-to-peak sync, negative, 75 ohms (standard UHF connector).

**Video Output**

1 volt peak-to-peak, sync, negative, 75 ohms into terminating input (standard UHF connector).

**Audio Input**

.25 volt RMS, 50K ohms (RCA phono jack).

**Audio Outputs (two provided)**

1. Recording Output (for taping audio of broadcasts): fixed level, 1 volt RMS, 2K ohms (RCA phono jack). Minimum recommended load impedance, 10K ohms.
2. Audio Out (for amplifying tuner or external source audio): level variable with volume control, maximum output 1 volt RMS, 1K ohms (RCA phono jack). Minimum recommended load impedance, 25K ohms.

### POWER REQUIREMENTS

120 volts AC, 60 Hz only, 2 amps, approx. 200w. max.

### DIMENSIONS

See Figures 1-1 and 1-2.

Weights: Projector: approximately 140 lbs.
Screen: approximately 68 lbs.; (38 lbs. without legs).

Specifications subject to change without notice.

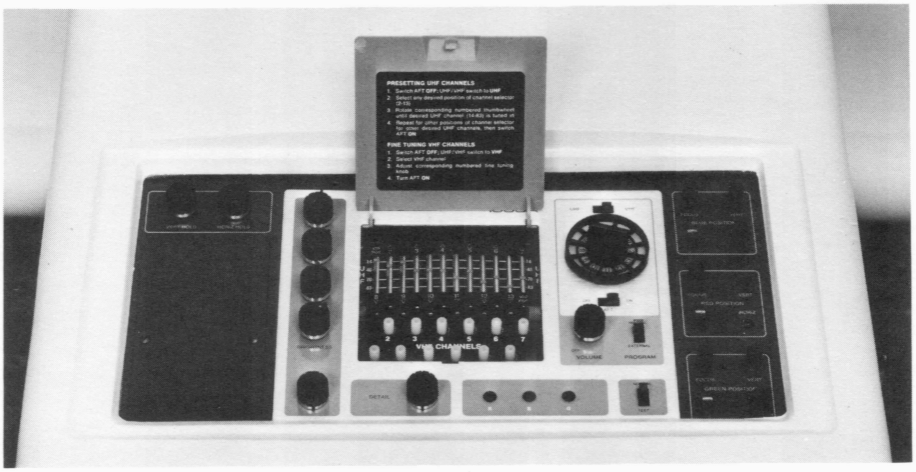


Figure 1-4. CONTROL PANEL